



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

June 5, 1997

The Honorable Edward J. Markey  
U.S. House of Representatives  
Washington, D.C. 20515-2107

Dear Congressman Markey:

I am providing an interim response to your letter of May 8, 1997, regarding safety concerns about the use of RTV silicone foam penetration seals in nuclear power plants and the NRC staff's efforts to address those concerns. In view of your immediate concerns about RTV silicone foam seals, this interim response explains how they perform their intended fire protection function. As you requested, the NRC staff will work with your staff to arrange an appropriate timetable for our complete response to your inquiry.

On the basis of its reviews, evaluations, and inspections, the NRC staff has concluded that properly designed and installed RTV silicone foam penetration seals will provide fire resistance equivalent to the barriers in which they are installed and will perform their intended fire protection function by confining a nuclear power plant fire to the area of origin. In addition, the multiple layers of fire protection provided at each reactor (defense in depth) offers reasonable assurance that penetration seal deficiencies, if any, will not result in actual safety consequences (for example, losses of safety systems, radiation overexposures, or offsite releases). For all these reasons, the use of RTV silicone foam penetration seals poses no risk to public health and safety.

Nuclear power plants are divided into separate areas by such structural fire barriers as concrete floors, walls, and ceilings. The fire protection function of these barriers is to prevent a fire that starts in one plant area from spreading to another area. A barrier's fire resistance rating, which is a measure of the extent to which the barrier resists the effects of fire, is determined by exposing a mockup of the barrier to an intense test fire for a required period. Most of the nuclear power plant fire barriers of interest here have a fire resistance rating of 3 hours. Openings are needed in structural fire barriers to allow such items as cable trays, conduits, pipes, and ventilation ducts to pass from one plant area to another. To maintain the fire protection function of the structural fire barriers, the openings or "penetrations" are sealed with materials that offer the same fire resistance as that of the barrier in which they are installed.

You correctly indicated that RTV silicone foam commonly is used as a component of fire barrier penetration seals installed in nuclear power plants and that RTV silicone foam is technically classified as "combustible" when it is tested in accordance with an American Society for Testing and Materials test method for combustibility. This characteristic is acknowledged in NRC NUREG-1552, "Fire Barrier Penetration Seals in Nuclear Power

Plants," which provides the staff evaluation of the potential fire hazards, concluding that the qualified silicone-based fire barrier penetration seals can accomplish their intended design function and are not credible fire hazards. It is important to note, however, that RTV silicone foam has different properties from the polyurethane foam used in the seal that was involved in the Browns Ferry fire of 1975.

Independent organizations, such as Underwriters Laboratories, Incorporated, have performed numerous fire resistance tests on full-scale mockups of RTV silicone foam penetration seals, using nationally recognized fire test standards. The NRC staff has observed such tests first hand, and has witnessed that RTV silicone foam penetration seals can provide the same level of fire resistance as the structural fire barriers in which they are installed. That is, the fire resistance of an RTV silicone foam penetration seal is equivalent to the fire resistance of the structural barrier. On the basis of such tests, the NRC staff has concluded that properly designed and installed RTV silicone foam seal designs can perform their intended fire protection function and thereby provide reasonable assurance that a fire will not spread from one side of the fire barrier to the other.

As you pointed out, a number of penetration seal defects have been identified, principally associated with problems in installation. The NRC staff has been aware of these deficiencies and has informed the nuclear industry of these problems through a series of information notices. The NRC staff has found that reactor licensees and seal material vendors and installers are generally aware of the importance of proper design, installation, inspection, maintenance, and repair of penetration seals. Further, based on the staff's review to date, the characteristics of potential penetration seal problems appear to be well understood. Nevertheless, the NRC staff expects that plant-specific deficiencies may be found during future licensee surveillances and NRC inspections. When such deficiencies are identified, the NRC staff will continue to ensure that appropriate corrective action is taken.

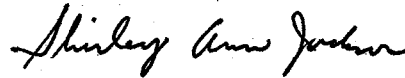
In your letter you point out that our regulations state that, "(P)enetration seal designs shall utilize only non-combustible materials..." and also point out that an NRC staff document concludes that there is no technical basis for such a requirement. The NRC staff plans to propose a rule change that would eliminate that requirement since there is no technical requirement for it. Further, this requirement postdates the construction of many of the nation's operating plants and is not applicable to many of them. The staff will provide additional details on this point in the specific answers and additional information you requested.

Notwithstanding these conclusions, I requested the NRC staff to update its assessment of RTV silicone foam fire barrier penetration seals. As a result, the staff has initiated an assessment of information on seal problems reported by licensees since their last assessment of such problems discussed in NUREG-1552. A copy of the NUREG is enclosed for your information. Further, the staff will accelerate its planned evaluation of penetration seal problems recently reported by Maine Yankee. The results of these efforts then will be assessed for new insights and appropriate opportunities for additional actions by the NRC or the industry.

I hope this letter resolves your immediate concerns that RTV silicone foam endangers public health and safety. Answers to your specific questions and the additional information you requested in your letter of May 8, 1997 will be provided to you under separate cover.

Please contact me if you need more information before you hear from me again.

Sincerely,

A handwritten signature in cursive script, reading "Shirley Ann Jackson".

Shirley Ann Jackson

Enclosure:

NUREG-1552, "Fire Barrier Penetration  
Seals in Nuclear Power Plants"

[Copies of NUREG-1552 can be obtained from Rep. Markey's office.]